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The weak part of the treatise, then, consists in the undue magnification of the importance of the analogy between gases and solutions and the unsuccessful attempt to make the ionic conception the basis of explaining chemical reactions. To eradicate these undesirable features will necessarily cause a somewhat profound change in the character of the book. The author has everywhere deliberately chosen to entirely omit 'in the interests of the student' a consideration of opinions which conflict with his own. This course can hardly be justified by the additional care which, it is stated in the preface, was exercised in the choice and exposition of the ideas presented, and will only make it all the more difficult to introduce the changes which sooner or later must be made in future editions of the book if it is to continue to be of real value.

LOUIS KAHLENBERG.

SOCIETIES AND ACADEMIES.

THE SAN FRANCISCO SECTION OF THE AMERICAN MATHEMATICAL SOCIETY.

THE fifth regular meeting of the San Francisco Section of the American Mathematical Society was held at Stanford University on April 30, 1904. Twelve members of the society were present. A morning and an afternoon session were held. Both these sessions were attended by a number of local teachers of mathematics who are not members of the society. The following papers were read:

PROFESSOR M. W. HASKELL: 'The construction of conics satisfying given conditions.'

PROFESSOR H. C. MORENO: 'On a class of ruled loci.'

DR. D. N. LEHMER: 'On a cylinder the intersection of which with a sphere will develop into an ellipse.'

MR. A. W. WHITNEY: 'The application of actuarial methods to fire insurance.'

PROFESSOR R. E. ALLARDICE: 'On the envelope of the directrices of a system of similar conics through three points.'

PROFESSOR IRVING STRINGHAM: 'Analytical treatment of certain metrical relations in the non-euclidean plane.'

PROFESSOR G. A. MILLER: 'Addition to a theorem due to Frobenius.'

PROFESSOR H. F. BLICHFELDT: 'A theorem concerning the invariants of linear homogeneous groups with some application to substitution groups.'

PROFESSOR H. F. BLICHFELDT: 'The linear homogeneous groups in four variables.'

PROFESSOR M. W. HASKELL: 'Triangles in perspective and the collineations derived therefrom.'

PROFESSOR M. W. HASKELL: 'The construction of a twisted cubic from six points.'

In the absence of Mr. Whitney his paper was read by Professor Stringham. The next meeting of the section will be held at California University on October 1, 1904.

G. A. MILLER,
Secretary.

MINNESOTA ACADEMY OF SCIENCES.

THE meeting of the academy was held in the geological lecture room of the University of Minnesota, on April 11, when the following paper was presented: 'The Gypsum Deposits of New York State,' by Mr. A. L. Parsons, instructor in geology in the University of Minnesota, illustrated by lantern slides.

Through the courtesy of Dr. Frederick J. H. Merrill, director of the New York State Museum, Mr. Parsons was enabled to present the results of his studies on the geology and economic importance of the gypsum deposits of New York before their publication as a state report. These deposits, which were among the first to be discovered and developed in this country, are in the rocks of the Salina age and are closely related to the salt deposits of the state. All the mines of importance are located in a shallow valley extending from Rome to Buffalo, and east of Rome the deposits, though of no commercial importance, are found on the south side of the Mohawk Valley as far east as Schoharie.

The formation of this valley occurred prior to the glacial epoch, and in the region between Syracuse and Rome it has been filled with several hundred feet of glacial and alluvial débris. The presence of this valley is explained by the wearing away of the soft Salina shales and soluble beds of salt and gypsum which lie between the harder limestones of the Niagara and Helderberg periods. With the development of the cement wall plaster and

the Portland cement industries these deposits, which up to that time were used only as a source of land plaster, have become of great importance as a source of plaster of Paris; and, although it is not as pure as Nova Scotia gypsum, it finds a ready market as a wall finish. Plaster of Paris is used at present in place of lime plaster as a wall finish on account of its quick setting, so that the buildings may be occupied without delay. It is also extensively used in the manufacture of Portland cement to retard the set, and, if not more than two per cent is used, it adds materially to the final strength. The manufacture of plaster of Paris depends upon driving off part of the water from gypsum, care being taken not to expel all the water, in which case the plaster fails to set. The hydrate formed in this way is known as plaster of Paris and has the property of again combining with as much water as has been driven off and forming a hard network of fine crystals, or, as it is called technically, the property of setting. The present processes of manufacture were then described, and an historical sketch of primitive and former methods was given.

Mr. Wm. A. Bryan, ornithologist of the Bishop Museum, Honolulu, described the work he was doing in cataloguing and describing the academy's Menage collection of birds of the Philippine Islands. This collection of over 4,500 birds was made by D. C. Worcester and F. S. Bourns in 1890-93, and was the best source of material for Mr. Bryan's purpose of working up all the birds of Polynesia as he has already done for the Hawaiian Islands.

H. GALE,
Secretary.

THE GEOLOGICAL SOCIETY OF WASHINGTON.

AT the 156th meeting, held April 27, 1904, Mr. N. H. Darton presented a paper on 'Salt Lake South of Zuni, New Mexico,' illustrated by stereopticon. Mr. Darton described the topography and geology of this interesting lake basin, and presented various theories for its origin. His paper will shortly be published in full.

Mr. George H. Ashley then discussed the

plain around Middlesboro, Ky., and its relation to the Appalachian structure of the region. A study of the general structure shows a differential yielding of the strata at this point to the tangential stresses that produced the deformation of the Appalachian province. This brought about transverse faultings with horizontal shearing, buckling, and in the shale around Middlesboro highly confused folding, possibly associated with a local downward flexure of the heavy Lee sandstone. The plain is the result of ponding, and a careful study of all the facts seems to indicate conclusively that to produce this ponding there has been recent movement along the old fault planes, or folds, or both. This movement has been at least one hundred and possibly several hundred feet vertical, and is possibly post-Tertiary in age.

The next paper, entitled 'The Significance of U-shaped Glacier and Stream Channels,' was by Francois E. Mathes.

The tendency to assume a U-shaped cross-section is not characteristic of glacier channels alone, and should not be looked upon as the peculiar result of ice action. Channels produced by streams of water exhibit the same tendency, and this type of cross-section should, therefore, be considered characteristic of all stream-worn channels, using the term stream in its broadest sense.

Observation on irrigation canals and ditches teaches that whatever their original cross-sections may be, they will in time be replaced by U-shaped ones. The transformation may be affected: (1) by enlarging, that is by cutting alone, (2) by cutting and filling combined, or (3) by filling alone. The resultant figure is the same in each case, provided the volume and the slope are the same. It further appears that after certain definite proportions of outline have been reached the cross-section no longer tends to change but remains virtually stable so long as the conditions of flow remain unchanged. It is inferred from this that a stream of constant volume, flowing on a uniform slope, tends to evolve a cross-section of certain definite proportions, this cross-section being the one through which the stream can flow with the greatest economy, that is to say,

with the least resistance. This may be termed the normal cross-section.

The shape of this normal cross-section is expressive of a well-ordered interior arrangement of the flowing mass; in other words, it indicates a definite organization of the stream. All streams should be considered as constantly endeavoring to organize; the more efficient their organization, the more economical their flow.

An analysis of the mode of flow was advanced many years ago by D. T. Smith in an essay on the 'Law of the Double Helix.' This theory was briefly outlined as not only affording a probable explanation of the manner of organization, but also satisfactorily accounting for the tendency to produce normal cross-sections of the shape described.

Whether this theory be accepted or not, the fundamental principle of organization stands unchanged. The tendency to evolve normal cross-sections is alone sufficient to establish it.

The application of this principle to the study of stream and glacier channels could not be considered for lack of time.

ALFRED H. BROOKS,
Secretary.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

THE 386th regular meeting was held on Saturday evening, April 16, 1904. Carleton R. Ball exhibited specimens of the dead nettle (*Lamium amplexicaule*) showing cleistogamous flowers which are produced abundantly in early spring. Later in the spring the large elongated open flowers are produced and the cleistogamous form disappears.

William R. Maxon spoke on 'Some Termite Nests of Jamaica,' describing three nests collected for the Smithsonian Institution in the vicinity of Hope Gardens, Jamaica, in the spring of 1903, and giving general notes (illustrated by photographs) on the occurrence and habits of *Eutermes ripperti*, the most common species of the island. Occupied nests, being the most perfect, were secured by poisoning several colonies of the insects. The nests secured were all of this species, which occurs abundantly in the lower dry limestone hills up to an altitude of 2,000 feet. They

are built without much discrimination upon the ground, in trees, upon old logs, walls, etc. The exterior of the nest consists of a thin granular, delicate fluted covering, very much more delicate than the darker honeycombed interior portion and very readily separable from it. The largest of the nests collected was exhibited, and also a queen cell and alcoholic specimens of queens, workers, nasuti and other forms of the insects. Notes on the life history of *Eutermes ripperti* contributed by E. A. Schwarz were also read.

Vernon Bailey spoke on 'A Simple Method of Preserving Tracks'; and exhibited a specimen of a mold of a wolf's track. A fresh track of a wolf was found in moist sand and melted paraffin from an ordinary candle was poured into it, producing a characteristic mold.

E. S. Steele gave an account of an investigation approaching completion of the globose-headed *Laciniarias*, *i. e.*, of the group of plant species which have been included under the name *Laciniaria* (or *Liatis*) *scariosa*. The investigation has had the benefit of ample material, comprising, besides that contained in the National Herbarium, numerous loans from institutions and individuals, and representing the territory from Maine to Florida, Texas, the Rocky Mountains and Saskatchewan, the Minnesota region being specially rich. Reference was made to the few hitherto published names applicable to this material. The characters upon which group and specific distinctions must turn were noted and illustrated by drawings, the involucral bracts and the foliage being the most important. The species, of which there were declared to be not less than sixty, were stated to fall into three fairly distinct groups. Mounted specimens of a number of the species were exhibited.

E. L. Morris read a paper on the 'History and Knowledge of the Bush Morning Glory and its Reproduction.' The species was first collected in 1820 and reported as annual. Later it was collected many times, and occasionally with enormous perennial roots which sometimes weighed as much as 200 pounds. Its reproduction is 'commonly by seed, but another method was mentioned not before re-

ported for the species, namely, the production of lateral root-shoots from the upper part of the narrow roots near the surface of the soil. These root-shoots at a favorable opportunity produce a bud which develops into a new plant. Drawings and specimens were presented to illustrate the paper, which will be published in full in the *Plant World*.

WILFRED H. OSGOOD,
Secretary.

THE CORNELL SECTION OF THE AMERICAN
CHEMICAL SOCIETY.

THE Cornell Section of the American Chemical Society closed the second year of its existence on May 3, when officers for the coming year were elected. An additional meeting will occur on May 31, at which the retiring president, Professor W. D. Bancroft, will give his president's address. He will discuss the theory of electroplating, and will illustrate his remarks by experiments.

From the first meeting of the Cornell Section in December, 1902, it has grown in numbers and interest. Seventeen new members have been added during the past year and at the present date there are forty-three members all told. A peculiarity of the Cornell Section is that its life and work are centered so entirely within the Cornell University Department of Chemistry. Of its members twelve are undergraduate students; seven, graduate students; and twenty-two, members of the staff of instruction of Cornell University. Two are connected with the Agricultural Experiment Station at Cornell.

The meetings of the year have been well attended and considerable interest has been evinced in original work. Eight sessions were held, with an average attendance of twenty-four members and twenty-five visitors. Eight papers, giving the results of research in the department, were read and discussed.

Dr. J. E. Teeple presented a paper on 'Bilirubin, the Red Coloring Matter of the Bile,' and another on 'The Electrolytic Preparation of Iodoform and Chloroform.' Mr. E. S. Shepherd presented 'An Apparatus for the Electro-deposition of Metals using a Rotating Cathode.' Mr. J. M. Bell discussed

the 'Vapor Pressure of Tobacco.' Mr. F. C. Robinson gave a description of 'A New Boiling Point Apparatus.' Dr. H. R. Carveth discussed the data obtained from a study of distillation, boiling point methods of molecular weight determination, and vapor composition. Dr. A. W. Browne presented some data and conclusions from experiments performed elsewhere in conjunction with Dr. W. P. Bradley on the 'Resistance of Glass Tubes to Bursting Pressure.' Mr. I. Baum read a paper which was produced in collaboration with Mr. F. J. Schwab, on 'Electrolytic Copper Refining.'

Aside from this original work the section has enjoyed several interesting addresses. Professor G. W. Cavanaugh outlined the 'Applications of Chemistry to Modern Agriculture.' Mr. J. A. Bonsteel gave a résumé of the work of the United States Soil Survey. Professor E. L. Nichols and Professor E. Merritt jointly gave an address on 'The Behavior of Indicators at Low Temperatures,' which they illustrated by experiments. Dr. E. M. Chamot discussed the results of the examinations of Ithaca waters during 1903. Dr. W. R. Orndorff lectured on the history and development of 'The Manufacture of Indigo from Coal Tar.'

The most notable meeting of the year was addressed by Professor Ernest Rutherford, of McGill University, on 'The Emanations of Radium.' His experimental lecture was enjoyed by a large audience of students and others interested in radioactivity.

The Cornell Section begins the next year with the following officers:

President—Professor E. M. Chamot.

Vice-President—Dr. J. E. Teeple.

Secretary-Treasurer—Mr. F. C. Robinson.

Executive Committee—The above officers *ex officiis* and Dr. H. R. Carveth, Mr. W. S. Bishop and Professor W. R. Orndorff.

Councilors—Dr. G. C. Caldwell and Professor L. M. Dennis.

WILLIAM C. GEER,
Secretary.

THE NEW YORK ACADEMY OF SCIENCES.
SECTION OF GEOLOGY AND MINERALOGY.

THE section held its regular meeting Monday evening, April 18, with the chairman, Professor James F. Kemp, presiding. The

evening was principally devoted to a paper by Dr. Arthur Hollick, of the New York Botanical Garden, entitled 'A Canoe Trip down the Yukon River from Dawson to Anvik.'

Dr. Hollick said in brief: The trip was made under instructions from the United States Geological Survey, with the special object of collecting paleobotanical material, from which to determine the age of certain exposures in central Alaska.

The party consisted of Dr. Hollick, Mr. Sidney Paige, field assistant, and Mr. John Rentfro, cook and general camp assistant. The start was made from Seattle, Wash., on June 1, 1903, by steamer to Skagway, Alaska, where they arrived on June 5 and remained until June 11, waiting for the ice to break up in the Yukon River. On June 11 the route was by railroad to Whitehorse, Yukon Territory; June 12-15, by steamboat down the upper waters of the Yukon to Dawson, Yukon Territory, where a nineteen-foot Peterborough canoe was purchased and the trip down the river begun. The trip was ended at Anvik, Alaska, August 12, after about 1,100 miles of the river had been explored and about 1,800 pounds of specimens had been collected and shipped. The highest point north was reached at Fort Yukon, July 2, just beyond the Arctic circle.

The Yukon River occupies what was until quite recently a broad estuary. Subsequent elevation of the land resulted in the draining of the estuary and the formation of the present river valley, which has cut its way down through the estuary deposits, leaving these as broad benches or terraces. Mastodon and other remains of extinct animals indicate the Pleistocene age of the deposits. One of the finest exposures is at the 'Palisades,' just below Rampart.

The width of the river varies from one to ten miles, and the main channel is constantly shifting. It pursues a meandering course, sometimes impinging on one side of the old valley, sometimes on the other; but for long distances it flows through the middle. Where it occupies the latter position, it is generally broad, with a current of about four miles per hour, and filled with innumerable wooded

islands, mud flats and sand and gravel bars, which render navigation more or less a matter of guesswork, on account of the impossibility of telling where the main channel may be and the liability of running into a blind slue or long circuitous channel around an island. It was often found advisable to climb up the river bank to a considerable elevation in order to determine, by means of an extended view, where the correct course lay. Where hard rocks were exposed along the river banks, or a short distance away, these were subjected to careful examination in regard to their lithologic, paleontologic and stratigraphic characters.

Amongst the interesting results obtained were: (1) the determination of the Tertiary age of certain sandstones above Rampart; and (2) the determination of the Cretaceous age of other sandstones and shales further down the river in the vicinity of Nulato. At one locality, a unique fossil flora was found, totally different from any heretofore known in America, consisting of cycads of Lower Cretaceous types, mixed with angiosperms belonging to what have always been considered Upper Cretaceous types.

Only a preliminary study has been made of the material collected, which will eventually be carefully examined and reported upon for the United States Geological Survey.

The paper was illustrated with about seventy lantern slides, showing the principal topographic and geologic features of the route.

The Grand Soufrière of Guadeloupe, an Analogue of Mont Pelé: EDMUND OTIS HOVEY.

Dr. Hovey showed twelve lantern slides illustrating the Grand Soufrière of Guadeloupe, and stated that the field evidence indicated that the present active cone of this volcano was closely analogous to the new cone and spine of Mont Pelé, Martinique, that is to say that it had been pushed up bodily into its present position, or had welled up through the conduit in such a viscous condition that contact with the atmosphere rendered it too rigid to flow. At the base of the cone on the north there is a gently rising flat area, apparently the segment of a circle indicating the position

of a part of the rim of a crater in existence before the construction of the present cone.

The map shown in connection with the paper was prepared by M. Léon Leboucher for the Club des Montagnards of Guadeloupe. This club has recently celebrated the first anniversary of its founding, and its report shows that it has done a great deal in a short time toward the opening up of roads and paths to the Soufrière, making the highest and one of the most interesting mountains of the Lesser Antilles readily accessible to visitors.

EDMUND OTIS HOVEY,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE METRIC SYSTEM.

TO THE EDITOR OF SCIENCE: Permit me to differ from Mr. William Kent as to the conclusion to be drawn from Professor W. Le Conte Stevens's article on the metric system. If he will substitute for the word 'impossibility' the word 'possibility' I shall be glad to agree that Professor Stevens's 'article is useful, however, in showing the possibility of the general adoption of the metric system in its present form by the people of this country.' There seems to be every probability that one will not have to live to be very old in order to see by experience this possibility become a fact, in this country as well as in England, which now seems likely to precede us in this reform, as she has in various political ones. I can not share the desire of Professors Lane and Stevens to temper the metric system to the conservatism of the American people by adopting its values disguised in the sheep's clothing of the present non-system. I believe that the intelligence of our people is not insufficient to enable them to drink their milk by the liter with as much gusto as by the quart, and to realize that six cents a liter is six dollars a hectoliter, even if a Greek prefix is involved. It takes a bold man to assert that the American people can not do what the French and Germans have done, and that they will not be able to see the advantage of it. If 'the people can not be compelled to adopt a nomenclature that is thrust upon them as a substitute for that to which they have always

been accustomed' we should have no decimal system of currency to-day, for the people were very much accustomed to pounds, shillings and pence, but seem to have been willing to be compelled to adopt dollars and cents (what an outrageous, foreign, difficult Latin word!), and in fact, seem even to prefer them. Is the inch more sacred than the pound? The engineer will reply, yes, and here we come to the kernel of the whole matter. It is the mechanical engineers and builders of machine tools who are delaying the adoption of the metric system. Now, while these persons constitute a very important part of the community, they do not constitute the whole of it. Drills, taps and dies, rigs and jigs are not the only argument that should be brought into the question, although engineers would have us believe it. Of course, it will cost us something to change our system, and this is a visible item. It is costing us more not to change it, but this is not so visible. I do not care to go into the arguments here, but merely to protest against the argument from conservatism, and also to suggest that the best way to find out the facts about the metric system is to apply, not to the engineers, who have not used it, but to the scientific men who have used it. The attitude of the conservative engineer toward changing the system of measurement is very similar to that of Cæsar toward the Senate: 'Can not is false, and that I dare not, falser; I will not' change.

ARTHUR GORDON WEBSTER.

*ZOOLOGY AND THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.**

This work has just come into my hands and I have examined it for references on the subject to which most of my attention is given, viz., Cœlenterata. The data given below will indicate the value of the catalogue, so far as Cœlenterata are concerned, in comparison with two other well-known bibliographic undertakings, the 'Bibliographia universalis' of the Concilium Bibliographicum and the *Zoological Record*.

For the year 1901, the Concilium Biblio-

* 'The International Catalogue of Scientific Literature.' First Annual Issue, N, Zoology [for the year 1901]: 1904 (February).